

Appl. No. 10/006,044
Amdt. dated 6/3/05
Reply to Office Action of 3/18/05

PATENT
Docket: 010264

REMARKS

This Amendment is responsive to the Office Action dated March 18, 2005. Applicants have amended claims 1, 9, 17-20, 25, 26, 31 and canceled claims 6, 21, 22, 27 and 36. Claims 1-38 are pending.

More specifically, Applicants have amended all pending independent claims to clarify that the invention defines a single command that causes a programmable video direct memory access (VDMA) controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory. As outlined in Applicants' specification, this can simplify read and write operations during video encoding by reducing or eliminating a high number of address calculations that would otherwise be necessary to locate the multidimensional block of video data stored in the non-contiguous rows of the memory. Notwithstanding the current claim amendments, however, Applicants do not acquiesce to any of the Examiner's rejections or characterizations of the prior art.

The current claim amendments substantially incorporate limitations formerly recited in claim 6 into the independent claims. Applicants traverse the Examiner's rejection of claim 6 to the extent such rejection may be considered applicable to the amended claims. The applied references, either alone or in combination, fail to disclose or suggest the features of Applicants' claims and provide no teaching that would have suggested the desirability of modification to include such features.

Independent claim 1 now recites a system comprising a memory having linearly addressable storage units to store video data; and a programmable video direct memory access (VDMA) controller to access the storage units of the memory in response to a command specifying a multidimensional block of video data and fetch the multidimensional block of video data from multiple non-contiguous rows of the memory in response to the command.

Independent claim 9 recites a method comprising receiving a direct memory access (DMA) command from a processor to transfer a multidimensional block of video data; generating a set of source addresses and a set of destination addresses for the multidimensional block of video data in response to the command, wherein the set of source addresses correspond to multiple non-contiguous rows of a source memory; and copying video data from the source memory to a destination memory according to the source addresses and destination addresses in response to the command.

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Independent claim 17 recites a device comprising a first memory to store a candidate video block to be encoded; a second memory to store a set of video data blocks from which to encode the candidate video block; a differential calculator to calculate differential metrics between the candidate video block and the set of video blocks; and a programmable video direct memory access (VDMA) controller to copy the candidate video block and the set of video blocks from a video memory to the first memory and the second memory, respectively, wherein the VDMA controller copies the set of blocks to the second memory in response to a single direct memory access (DMA) command specifying a multidimensional search space of video data stored within the video memory in multiple non-contiguous rows.

Independent claim 31 recites a device comprising means for receiving a direct memory access (DMA) command from a processor to transfer a multidimensional block of video data; means for generating a set of source addresses and a set of destination addresses for the multidimensional block of video data in response to the command, wherein the set of source address correspond to multiple non-contiguous rows of a source memory; and means for copying video data from the source memory to a destination memory according to the source addresses and destination addresses.

In the Office Action, the Examiner rejected claims 1-2, 4-5, 9-11, 13-14, 31-33, 35-36 under 35 U.S.C. 102(b) as being anticipated by Kohashi et al. (EP Patent No. 1,146,746) and rejected claims 7-8, 18, 20, 28-30, 37, and 38 under 35 U.S.C. 103(a) as being unpatentable over Kohashi. Applicants do not acquiesce to any of these rejections, but note that the current amendments to the independent claims should overcome all of these rejections insofar as limitations similar to those of former claim 6 have been incorporated into all independent claims. Applicants reserve further comment on these rejections at this time, but do not admit or acquiesce to the propriety of these rejections.

In the Office Action, the Examiner rejected claims 3, 6, 12, 25, and 27 under 35 U.S.C. 103(a) as being unpatentable over Kohashi in view of Langendorf et al. (USPN 6,313,766). Again, all pending independent claims have been amended to include limitations similar those formerly recited in claim 6. More specifically, Applicants have amended all pending independent claims to clarify that the invention makes use of a command that causes a programmable video direct memory access (VDMA) controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory.

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In the rejection of claims 3, 6, 12, 25, and 27 under 35 U.S.C. 103(a) as being unpatentable over Kohashi in view of Langendorf, the Examiner recognized that Kohashi lacks any suggestion a command that causes the controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory, e.g., as formerly recited in claim 6, or a command that includes a jump parameter, e.g., as recited in claim 3. However, the Examiner appears to have cited Langendorf as disclosing these features. Based on the Examiner's interpretation of Langendorf, the Examiner concluded that a person of ordinary skill in the art would have been motivated to modify the video processing apparatus of Kohashi in view of Langendorf to arrive at Applicants' invention, as formerly recited in claim 6.

Applicants strongly disagree. Langendorf teaches nothing even remotely related to an instruction that causes a controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory. In fact, Langendorf appears to lack any teaching with regard to the fetching of video blocks, whatsoever. Instead, Langendorf describes decoding techniques for variable length encoded information. While Langendorf mentions applications such as Digital Versatile Disc (DVD) playback, video conferencing, video telephony, nothing in Langendorf concerns the fetching of video blocks, much less a single instruction that causes a controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory. On the contrary, Langendorf concerns variable length codes that are separated by headers, and does not address video data stored in a linearly addressable memory space such that specific video blocks may be separated by other pixels of a video frame. In this sense, Langendorf is concerned with problems entirely different than those addressed by Applicants' claims.

The Examiner's analysis of Langendorf in the Office Action refers to FIGS. 5 and 7 and cites various components of these figures. However, nothing in either of FIGS. 5 or 7 of Langendorf suggests an instruction that causes a controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory. Any such teaching is simply lacking from the figures and related discussion cited by the Examiner. FIGS. 5 and 7 of Langendorf illustrate systems for decoding variable length encoded information. These figures and the related discussion, however, lack any suggestion of the use of a single instruction that causes a multidimensional block of video data to be fetched from multiple non-contiguous rows of the memory.

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Applicants also submit that the Examiner failed to identify any motivation that would have led a person of ordinary skill in the art to modify the video processing apparatus of Kohashi in view of Langendorf to arrive at Applicants' invention. In the Office Action, the Examiner merely stated that: "it would have been obvious to one skilled in the art to utilize the method as taught by Langendorf et al. in combination with the method taught by Kohashi et al in order to communicate the physical memory locations of a large block of data" (citing column 5, lines 2-5). In this portion of the Office Action, the Examiner has taken the cited passage out of context. Column 5, lines 2-5 of Langendorf does not suggest an instruction that causes a multidimensional block of video data to be fetched from multiple non-contiguous rows of the memory. On the contrary, the passage at column 5, lines 2-5 concerns variable length codes that are separated by headers, which cause such variable length codes to be stored in a non-sequential manner. See column 4, lines 62-66, which immediately precedes the passage cited by the Examiner. The Examiner's statement that a person of ordinary skill in the art would have been motivated to "communicate the physical memory locations of a large block of data," is nothing more than the Examiner's recitation of column 5, lines 2-5 of Langendorf, which when properly read in the context of Langendorf, is totally unrelated to the features of Applicants' claims that recite an instruction that causes a multidimensional block of video data to be fetched from multiple non-contiguous rows of the memory. Langendorf does not suggest this feature of Applicants' claims.

The Examiner also refers to column 4, lines 60-67 and column 5, lines 1-5 of Langendorf as teaching that a stream of data may be stored in non-sequential pages of physical memory. However, nothing in this section of Langendorf describes video blocks stored in non-contiguous rows, much less a command specifying a multidimensional block of video stored in non-contiguous rows. Moreover, nothing in this section in Langendorf is even remotely suggestive of a command that causes a controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory, as required by Applicants' claims.

In short, Langendorf lacks any teaching or suggestion of a command, as defined in Applicants' claims. Again, Applicants' claims require a command that causes a controller to fetch a multidimensional block of video data from multiple non-contiguous rows of the memory. The Examiner has failed to identify anything in Kohashi or Langendorf that suggests this feature. Therefore the Examiner has failed to establish a *prima facie* case of obviousness.

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With regard to dependent claims 3, 12, 25 and 34, which recite that the command specifies a jump parameter indicating a number of storage units between each row of the video block, Applicants are confused as to the Examiner's rejection. For example, the Examiner did not identify anything in Langendorf that suggests any command having a jump parameter, much less a jump parameter indicating a number of storage units between each row of the video block, as required by claims 3, 12, 25 and 34. Langendorf is simply void of any suggestion of this feature of Applicants' claims. Therefore, the rejection of claims 3, 12, 25 and 34 is improper. Claims 3, 12, 25 and 34 specifically recite that the command specifies a jump parameter indicating a number of storage units between each row of the video block. As the Examiner has not identified this feature in Kohashi or Langendorf, the rejection of claims 3, 12, 25 and 34 must be withdrawn.

For at least the reasons set forth above, all claims in this application are in condition for allowance. Applicants respectfully request reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 17-0026. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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CONCLUSION

In light of the amendments contained herein, Applicants submit that the application is in condition for allowance, for which early action is requested.

Please charge any fees or overpayments that may be due with this response to Deposit Account No. 17-0026.

Respectfully submitted,

Dated: 6/3/05

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